

C O P YTHE CITY OF WASHINGTON AND AN ATOMIC BOMB ATTACK

The effects of the explosion of an atomic bomb in a metropolitan area and the problems in civil defense that ensue differ in both quality and quantity from those of high explosive bombing.

The experience of the bombed cities of England and Germany may be utilized for lessons in fighting fires, rescue of trapped personnel, and large-scale care for the wounded and homeless. Knowledge of the problems which are peculiar to an atomic bomb attack, on the contrary, must come from a study of what occurred at Hiroshima and Nagasaki where the bombs were fused to detonate high in the air. The Japanese estimated that the heights of burst were 550 to 600 meters, that is, approximately 1800 to 1970 feet. While there is no assurance that an enemy might not detonate his bomb in water adjacent to a city, on the surface of the ground, or underground--each of which would bring its own unique problems--it is more likely that he would resort to an air burst because the latter would devastate a larger area on the surface of the ground. That is, a bomb equal in power to the Nagasaki bomb, if detonated in air over an American or European city, would crush or otherwise render useless the residences, as an example, over an area of 6 to 8 square miles. It presents not only a radiation hazard, but an explosive hazard beyond any block-busters and a fire hazard beyond any incendiaries.

From such a burst there would be four effects near the surface of the ground; (1) blast, that is, a wave traveling with approximately the velocity of sound would engulf objects in a high pressure, (2) wind of considerable velocity would follow the blast as the highly heated air near the point of detonation expanded, (3) heat traveling with the velocity of light, would strike exposed objects and kindle fires and (4) radiation would penetrate the bodies of exposed personnel. Two additional effects should be mentioned. First, from the detonation of the bomb there would result highly radioactive fission products which would rise with the cloud from the bomb to be scattered harmlessly at great distances by the air. Second, near ground zero--the point on the ground directly beneath the point of burst--the radiation would cause objects to become radioactive but at a level which, to judge by Japanese experience, would be harmless to those who entered the area on rescue missions immediately after the incident.

If an atomic bomb is exploded quite close to the ground, as at Alamogordo, there will be a small area of residual radioactivity. If a bomb is exploded in water, such as Test Baker at Bikini, there will be considerable amounts of residual radioactivity, depending upon wind, currents, tides and the size of the body of water.

The blast and wind, which may be considered together, would crush or render unusable the ordinary load-bearing brick wall

dwelling for a distance of 7000 or 8000 feet from ground zero, would severely damage steel mill-type buildings for a distance of 4000 to 5000 feet, and would cause substantial structure damage in multi-story steel or reinforced concrete buildings up to distances of 2500 feet.

Accordingly, in an instant the usually dependable telephone, telegraph, electric service, and transportation (both public and private) would cease to exist in the damaged area. Also because of the numerous broken pipes in houses, water pressure would fall to near nothing.

In addition to the direct fires which would follow the flash heat, there would be many more which would start from broken gas and electric lines and in particular, from combustible material coming into contact with cooking and process fires. Firefighting equipment inside the damaged area would probably be crushed by the collapse of the fire-houses and with water pressure gone the many fires would speedily merge to destroy the greater part of the crushed area.

While this is happening, what would be the fate of the people? In Japan, the number of casualties was enormous because the attacking planes were not heeded and people were caught in the open or with inadequate cover. Consequently, great numbers were badly burned by the flash, many so severely that they died within a short time, or were exposed to such a level of radiation that they died. As radiation passes through the body in any considerable amount a number of tissues which are necessary for normal health are damaged. At Hiroshima and Nagasaki everyone within one-half mile not protected by earth, steel or concrete died and the incidence of radiation injury was very high up to approximately one and a quarter miles from ground zero.

With adequate warning which was heeded and adequate shelters which were occupied the casualties could be greatly reduced. Furthermore, doctors with ample medical supplies, hospital facilities, and blood banks would save many of those who were injured by blast or burns.

No one can do the enemy's thinking for him and decide what he would select as his aiming point in Washington. In addition to some purely military establishments like the Naval Gun Factory there are three obvious targets: (1) The Pentagon, (2) the area near the Capitol which includes the Senate and House Office Buildings, and the Union Station, and (3) assuming 5000 feet as the diameter of the circle in which there would be severe damage, the area in which is located the White House, Treasury Department, Executive Office, State Department, Interior Department, Navy Department, Pan American Union, Federal Power Commission, Court of Claims, Brookings Institution, National Advisory Committee for Aeronautics, Inter-

American Defense Board, American Council on Education, Carnegie Endowment for International Peace, Red Cross, Federal Works Agency, Veterans Administration, Federal Reserve, Reconstruction Finance Corporation, and Atomic Energy Commission. Aiming accuracy being something less than perfect, it is clear that other sites on the rim of the area would also be endangered.

The 5000-foot diameter circle has been assumed somewhat arbitrarily. It is known from the experience in Japan that at distances of 2500 feet from ground zero substantial modern tall buildings would suffer such damage that 10 to 15 per cent of their main columns and beams would require replacement, much of their outer wall shell would be stripped off, and they would lose their partitions and their windows. As the distances to ground zero became less the damage would become progressively greater.

Because it represents modern construction and because the data are available, the Atomic Energy Commission Building is selected as an object for study. Would it protect its population in an attack? From its plans it is found that the building has the following above its floors:

Cover Above	Inches of Concrete
Attic Floor	2-1/2
3rd Floor	9-1/2
2nd Floor	17-1/2
1st Floor	25-1/2
Basement	33-1/2

The maximum thickness mentioned, that is 32 to 34 inches, may protect against the radiation hazard from a bomb detonating overhead at a height of 1800 feet. No one can predict the strength of an enemy's bomb. Furthermore, windows, partitions and possibly walls would become missiles. There would be approximately 80% casualties and added to this an unknown number of radiation deaths. Naturally, less substantial buildings and their inhabitants would suffer much greater damage. The inevitable conclusion is that the building should be abandoned in the event of an impending attack, or well before. These predictions for the AEC building are generally applicable to Government buildings in Washington.

Metropolitan business districts, in which there are great concentrations of population during working hours, are additional vulnerable areas. Shelters for these populations may be provided in basements and in the interior of lower stories of large buildings if the work is undertaken in time. However, adequate warnings must be assumed for any shelter to be effective. Hence, dispersal is far preferable.

It must be regarded as probable that fire will spread from the outside to buildings which have been opened by blast and that, in the absence of firefighting, their contents will be destroyed. In consequence, valuable records or microfilm copies should be removed to storage vaults.

The hard fact is that a shelter system, while saving the lives of the persons who take shelter, does not guarantee the resumption of vital functions. For example, in the event of an attack upon the Atomic Energy Commission building the building would be completely destroyed and following the attack those who emerged from the shelter would be quite helpless to carry on the far-flung operations of the atomic energy program.

The alternative to the shelter system and an alternative which not only saves the lives of key personnel but also permits at the same time a continuance of the vital governmental operating functions is--dispersal. The problems which it presents, physical, financial and psychological, are obviously tremendous and beyond the scope of this paper and the authority of this agency.

Long-range community planning to place projected hospital, fire stations and other essential emergency services in properly dispersed fashion should be encouraged. Routes available for emergency evacuation should be planned. These may well provide effective fire lanes through areas now highly vulnerable.

The attractiveness of the target vanishes with dispersal of some or all of the above mentioned agencies. Scattered in the outskirts of the Washington area with distances of perhaps two miles between targets, the agencies would have a fair measure of security because no single one of them would be likely to warrant the expenditure of a bomb. Also, and equally important, persons who live adjacent to the original area would be less in jeopardy because the enemy would seek his target elsewhere.

From the experience at Hiroshima and Nagasaki it is clear that if an attack comes to an unwarned population the most that can be expected of them will be that the uninjured will rescue those who are trapped or injured before they are reached by fire. Because of the confusion and destruction which will follow a bomb burst, general relief must come from the outside. Washington, if attacked, would look for help--that is, for workers, supplies, and equipment--from its outlying undamaged ring and its suburban areas and from cities as distant as Baltimore, Philadelphia and Richmond. Relief must be organized with this in view. Supplies, supplementary fire-fighting equipment and new hospitals must be kept outside vulnerable areas.

→ *not as now planned in Observatory Circle on Mass. Ave!*

Safety will, in large measure, depend upon adequate warning of an attack, warning which it must be assumed will come from the radar system of the National Military Establishment. Such warning when combined with shelters for those who must stay in threatened areas, will minimize, or even eliminate, casualties. Less effective measures may result in panic, suffering, and 80,000 deaths as at Hiroshima.

Washington
New York
Pittsburgh
Detroit
Birmingham

} had best take
to the hills.

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